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XXII. *Astronomical Observations.* By STEPHEN GROOMBRIDGE, Esq. F. R. S.

Read June 29, 1820.

Observations of the Solstices in the years 1818 and 1819.

*Observed zenith distance of the Sun's centre on the meridian.*

1818		Barometer.	Therm. within.	Therm. without.	Refraction.	1819		Barometer.	Therm. within.	Therm. without.	Refraction.
June 13	28.14 53.08	29.79	72.5	81	0.29.77	June 9	28.33.30.54	29.49	61.5	68	0.30.54
14	28.11.38.72	29.87	68	66	0.30.10	16	28. 6.40.00	29.84	58	62	0.30.62
23	28. 0. 5.55	29.76	62	66	0.30.15	19	28. 1.20.52	30.00	62	68	0.30.38
27	28. 5.39.66	29.75	68	79	0.29.84	20	28. 0.21.51	30.11	62.5	66	0.30.45
28	28. 8. 9.04	29.69	66	73	0.29.97	21	27.59.47.37	30.04	62.5	68	0.30.37
29	28.10.55.40	30.08	67	72	0.30.37						
July 1	28.17.51.98	30.00	69.5	77	0.30.27						
Dec. 12	74.29.34.34	30.06	44	40	3.31.92	Dec. 13	74.32.57.59	29.70	36	32.5	3.33.32
14	74.37.55.16	30.15	43.5	41	3.34.10	26	74.48.56.96	29.44	39	32	3.35.50
19	74.50.26.17	30.21	38	34	3.40.54	27	74.46.54.68	29.39	39	34	3.33.78
22	74.52.23.59	30.45	42.5	33	3.43.15						
23	74.52. 3.00	30.31	38.5	31	3.42.94						
27	74.46.16.87	30.06	39	37	3.37.14						

*The above observations computed by Mr. GROOMBRIDGE'S Table of Refraction.*

1818	Zenith distance.	Equation.	Solstitial distance.	1819	Zenith distance.	Equation.	Solstitial distance.
June 13	28.15 22.85	15.15.31	28. 0. 7.54	June 9	28.34. 1.08	33.54.65	28. 0. 6.43
14	12. 8.82	11.55.34	13.48	16	7.10.62	7. 1.93	8.69
23	0.35.70	0.24.45	11.25	19	1.50.90	1.39.50	11.40
27	6. 9.50	6. 1.15	8.35	20	0.51.96	0.41.67	10.29
28	8.39.01	8.27.31	11.70	21	0.17.74	0. 8.60	9.14
29	11.25.77	11.17.91	7.86				
July 1	18.22.25	18.12.52	9.73				
			28. 0. 9.99		Nutation	+ 9.23	28. 0. 9.19
	Nutation	+ 7.40			Parallax	- 4.11	+ 4.62
	Parallax	- 4.11	+ 2.77		Sun's Latitude	- 0.50	
	Sun's Latitude	- 0.52					28. 0.13.81
			28. 0.12.76	Dec. 13	74.36.30.91	19.36.30	74.56. 7.21
				26	52.32.46	3.32.75	5.21
				27	50.28.46	5.36.53	4.99
Dec. 12	74.33. 6.26	22.57.04	74.56. 3.30				
14	41.29.26	14.38.20	7.46				74.56. 5.80
19	54. 6.71	1.58.11	4.82		Nutation	- 9.60	
22	56. 6.74	0. 0.18	6.92		Parallax	- 8.45	- 18.58
23	55.45.94	0.17.56	3.50		Sun's Latitude	- 0.53	
27	49.54.01	6.10.39	4.40				74.55.47.22
			74.56. 5.07				28. 0.13.81
	Nutation	- 8.64					2)46.55.33.41
	Parallax	- 8.45	- 17.58				
	Sun's Latitude	- 0.49					
			74.55.47.49	1819	Mean Obliquity	- - - -	23.27.46.70
			28. 0.12.76	1818	- - - -	- - - -	23.27.47.36
			2)46.55.34.73				
					Mean obliquity at the } vernal equinox, 1819. }		23.27.47.03
	Mean obliquity, 1818		23.27.47.36				

*Oppositions of the New Planets.*

	Mean Time.	Right Ascension.	Declination.	Longitude.	Latitude.
	h m s	° ' "	° ' "	° ' "	° ' "
1818.	Vesta.		Par. + 5.3		
April 3	12.47.39	203.38.54.3	3.55.53.3 N	200.23.41.8	12.50.31.8 N
4	12.42.50	203.25.47.4	4. 2. 6.0	200. 8.52.1	12.51.23.5
12	12. 4. 9	201.36.56.4	4.46.53.1	198. 8.26.5	12.51.55.3
15	11.49.35	200.55.18.7	5. 0.54.2	197.23.37.9	12.49. 6.0
17	11.39.54	200.27.48.1	5. 9.18.5	196.54.22.4	12.46.24.1
	Pallas.		Par. 3.0 3.2		
Sept. 1	12.20.21	345.38.31.6	2.10.22.4 N	347.38.10.3	7.40.11.7 N
2	12.15.40	345.27.15.1	1.57.46.6	347.22.45.1	7.32.58.6
6	11.56.56	344.42. 4.6	1. 6.25.2	346.20.42.6	7. 3. 9.5
9	11.42.53	344. 8. 3.1	0.27. 5.2	345.33.48.0	6.40. 1.3
11	11.33.31	343.45.24.6	0. 0.29.5 N	345. 2.27.3	6.24.12.1
12	11.28.50	343.34. 9.1	0.12.50.9 S	344.46.50.3	6.16.13.0
13	11.24. 9	343.22.52.8	0.26.15.1	344.31.11.5	6. 8.10.1
1820.	Pallas.		Par. —6.1 —5.7		
Feb. 1	9.42.57	96.45. 6.6	25.32.13.7 S	99.15.54.7	48.47. 4.0 S
4	9.30.22	96.33.10.2	24.30.48.1	98.53.18.1	47.46.32.0
6	9.22. 9	96.27.45.0	23.49.10.4	98.41.59.8	47. 5.57.5
10	9. 6. 5	96.22.35.4	22.19.58.0	98.26.41.6	45.36.37.1
16	8.43. 1	96.30.28.2	20. 1.36.7	98.24.49.8	43.18. 4.7
17	8.39.16	96.33.26.7	19.37.58.7	98.26.38.8	42.54.19.0
	Ceres.		Par. +1.9 +1.7		
Feb. 1	11.49.38	128.30.18.9	31.29. 3.2 N	122.55. 5.1	12.19. 4.7 N
4	11.34.57	127.47. 5.7	31.44.49.4	122.14.33.3	12.25. 4.3
10	11. 5.54	126.24.49.8	32.11. 3.4	120.58.39.7	12.33.19.8
16	10.37.26	125.11.27.3	32.29.41.0	119.52.25.4	12.36.37.2
17	10.32.46	125. 0.23.1	32.32. 1.8	119.42.33.6	12.36.42.6